

CLAIMS

1. An apparatus for lowering internal battery resistance, comprising a pulse generator for delivering pulses to at least one terminal of the battery and a
5 controller for controlling the pulse generator and comprising a voltage input selector for selecting the voltage at which the controller is operated.
2. The apparatus as claimed in claim 1 wherein the voltage input selector comprises at least two
10 threshold voltages at which the controller operates.
3. The apparatus as claimed in claim 1 or 2 wherein the voltage input selector comprises a high voltage threshold and a low voltage threshold.
4. The apparatus as claimed in claim 1, 2 or 3
15 wherein the voltage input selector comprises a switch coupled to a voltage divider.
5. The apparatus as claimed in claim 4 wherein the controller has an input connected to the output of the pulse generator.
- 20 6. The apparatus as claimed in claim 5 wherein the controller has an output connected to an input stage of the pulse generator.
7. The apparatus as claimed in claim 6 wherein the controller includes a comparator for comparing the
25 threshold of the voltage input selector with a reference voltage.
8. The apparatus as claimed in claim 7 wherein the reference voltage is derived from the battery.
9. The apparatus as claimed in claim 8 wherein
30 the comparator outputs a signal to the output of the threshold voltage is above the reference voltage.
10. The apparatus as claimed in claim 9 wherein the pulse generator comprises an input stage including a wave generator for generating a wave having a
35 predetermined frequency and wave width.
11. The apparatus as claimed in claim 10 wherein the wave generator comprises a square wave

generator.

12. The apparatus as claimed in claim 11 wherein the pulse generator includes an input switch controlled by the controller.

5 13. The apparatus as claimed in claim 12 wherein the output switch comprises a transistor.

14. The apparatus as claimed in claim 1 or 13 wherein the controller is configured to vary the amplitude of pulses delivered to the battery in accordance with the
10 internal resistance of the battery.

15. The apparatus as claimed in claim 14 including a battery condition circuit for indicating the amplitude of predetermined pulses delivered to the battery.

16. An electronic circuit for indicating a
15 battery condition, comprising an indicator means, a first input for connection to a battery, a second input for connection to an output of a controller of a pulse generator wherein the indicator means provides an
20 indication of the voltage of a pulse applied to the battery.

17. The electronic circuit as claimed in claim 16 wherein the indicator means provides an indication that the voltage of a pulse applied to a battery has one of a
25 plurality of possible amplitudes.

18. The electronic circuit as claimed in claim 17 wherein the indicator means includes three different indicators.

19. The apparatus as claimed in claim 18
30 wherein the indicator means comprises three LEDs each connected to an output stage of an associated operational amplifier.

20. The electronic circuit as claimed in claim 19 wherein an input of each of the operational amplifiers
35 is connected to a reference voltage source.

21. an apparatus for lowering battery internal resistance, comprising a wave generator, a filter circuit,

a switch and an inductor means wherein the switch is configured to be switched on in accordance with the signal generated by the wave generator and in combination with the inductor means is configured to generate a periodic pulse which can be applied to a terminal of a battery, whereby the internal resistance of the battery is lowered.

22. The apparatus as claimed in claim 21 wherein the inductor means is connected to an output of the switch and to an output of the filter.

23. The apparatus as claimed in claim 21 or 22 wherein both the switch and inductor means are connected to one terminal of the battery.

24. The apparatus as claimed in claim 23 including a pulse width selector for altering the width of the pulse generated by the apparatus.

25. The apparatus as claimed in claim 21 or 24 including a pulse frequency selector for adjusting the frequency of the pulse generated by the apparatus.

26. The apparatus as claimed in claim 21 wherein the inductor means comprises two inductors in parallel.

27. The apparatus as claimed in claim 26 including a controller for selectively controlling operation of the apparatus in accordance with a threshold voltage setting.

28. The apparatus as claimed in claim 27 wherein an input of the controller is connected to the inductor means and the switch.

29. The apparatus as claimed in claim 21 including a controller for selectively controlling operation of the apparatus depending on a threshold voltage setting of the controller and a battery internal resistance indicator for providing a visual indication of at least two different internal resistance values for the battery.